Tuesday, March 5, 1991
4:00PM–5:30PM, Room 202, East Concourse
Diagnosis and Prognosis of Coronary Artery Disease

4:00

COMPARISON OF QUANTITATIVE THALLIUM TOMOGRAPHY AND CORONARY ANGIOGRAPHY IN RISK STRATIFICATION

Joseph Lemleck, Thach Nguyen, Sally Beer, Jaekyeong Heo, Abdulmassih Iskandrian, Philadelphia Heart Institute, Presbyterian Medical Center, Phila, PA

An important advantage of single-photon emission computed tomography (SPECT) with thallium-201 is the ability to quantitate the extent and severity of jeopardized myocardium. This study compared the extent and severity scores derived from quantitative analysis of the polar maps using exercise SPECT thallium imaging to the number of vessels diseased (VD) (by coronary angiography) in predicting hard cardiac events (death or nonfatal myocardial infarction). There were 443 pts aged 60 ± 10 years; 64 with 0VD, 117 with 1VD, 144 with 2VD and 118 with 3VD. There were 12 events during a follow-up of 24 ± 10 months. Using Cox Survival Analysis, the following variables were examined; age; number of VD; exercise ECG response, heart rate and duration; presence of abnormal scans and ischemia; percent perfusion abnormality (extent), and severity score (which takes into consideration the extent and degree of abnormality). By multivariate analysis, only the extent score was a statistically significant predictor of future events (X^2 = 8.0, p < 0.005). Using life table analysis, the event rate was 0.5% in 216 pts with extent abnormality < 15% vs 5.0% in 227 pts with ≥ 15% abnormality (Mantel-Cox, p < 0.0003).

Thus, this study documents for the first time, the importance of quantitative data obtained by SPECT thallium imaging in risk stratification in pts in whom the coronary anatomy fs defined by coronary angiography.

4:15

Value and Limitation of Thallium-201 Scintigraphy In Myocardial Infarction Patients After Thrombolytic Therapy

Howard L. Haber, Lawrence W. Gimple, Denny D. Watson, and George A. Beller, University of Virginia, Charlottesville, VA.

We determined the utility of exercise (Ex) thallium-201 (Tl) scintigraphy for (1) identifying multivessel disease (MVD), (2) detecting residual ischemia, and (3) assessing myocardial viability in 88 consecutive patients (pts) with acute myocardial infarction (43% anterior, 83% Q wave, mean age 55±1 yr) who received thrombolytic therapy within 6 hours of chest pain for ≥1 mm ST segment elevation. Seventy-seven (88%) had submaximal Ex-Tl predischarge; 21 (24%) had angioplasty prior to Ex-Tl. Quantitative planar Tl scintigrams were blindly analyzed for the presence of redistribution as well as myocardial viability. Viability was defined as lack of a persistent defect or <50% reduction in Tl-201 uptake within the infarct zone. Coronary angiograms were blindly analyzed for infarct related artery patency and the presence of MVD, defined as a stenosis ≥50% in one or more non-infarct vessels. The patency rate following thrombolytic therapy was 81%; an additional 7 vessels (8%) were opened by angioplasty; 31 pts (35%) had MVD (mean non-infarct artery stenosis = 80±3%). The sensitivity and specificity of Ex-Tl defects outside the infarct zone for MVD were 35% (11/31) and 93% (54/58), respectively. Values for Ex-ST↓ (≥1.0 mm) for MVD detection were 33% (10/31) and 96% (52/54) respectively, (p=NS vs Ex-Tl). Overall incidence of residual ischemia by Tl (redistribution in any segment) was 44% compared to 14% by Ex-ST↓ (p<0.001). Residual ischemia within the infarct zone by Tl was present in 34% of pts; of these only 16% (5/32) had Ex-ST↓ (p=NS). Fifty-one pts (58%) had evidence of myocardial viability in the entire risk area. Of those with non-viable regions, 67% (35/52) developed new or further ST elevation during exercise (p=0.04).
In conclusion, in pts who receive thrombolytic therapy, Ex-Tl scintigraphy offers little advantage over Ex-ST↓ for the identification of MVD, but is significantly more sensitive than Ex-ST↓ in detecting and localizing residual ischemia. Finally, more than one-half of patients had demonstrable viable myocardium in the entire infarct zone.

4:30

LOCALIZATION OF SINGLE VESSEL DISEASE BY PLANAR THALLIUM IMAGING

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In the VA ACME(Angioplasty Compared to MEdicine) study, all randomized pts.have ≥ 70% stenosis of one major coronary artery plus a positive exercise ECG and/or thallium off medications at baseline. Location of Thallium 201 perfusion defect and involved artery was compared for the first 161 pts. with a positive study.

n=161:	RCA(n=50)	LAD(n=68)	LCx(n=43)
Anterior View			
1 Inferior	32 (64%)	26 (38%)	18 (42%)
2 Apical	36 (72%)	55 (81%)	30 (70%)
3 Anterolateral	0 (0%)	14 (21%)	2 (5%)
LAO View			
4 Septal	14 (28%)	41 (60%)	4 (9%)
5 Apico-inferior	36 (72%)	53 (78%)	21 (49%)
6 Posterior	5 (10%)	6 (9%)	18 (42%)
Lateral View			
7 Anterior	4 (8%)	34 (50%)	1 (2%)
8 Apical	29 (58%)	58 (77%)	20 (47%)
9 Inferior	24 (48%)	10 (15%)	22 (51%)

* (p<0.05) **(p<0.01)

Conclusion: Overall, the LAO and lateral views were more effective at discerning the location of the diseased vessel. Defects in regions 3,4,5,7**, and 8* favor an LAD lesion, region 6 favors LCx**, region 1 favors RCA, and region 9* is compatible with either LCx or RCA lesions. Apical defects were least effective at discriminating disease location, consistent with the known variability of apical perfusion.

4:45

Does Exercise Intensity Affect Subsequent Thallium-201 Imaging Results?

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Although clinical decisions are made based upon the extent of thallium-201 (TL) defects, the effect of exercise intensity upon the TL defect size has not been evaluated. Symptom-limited incremental exercise (IE) was compared with submaximal low level steady-state exercise (LLE) at 70% of the heart rate achieved with IE in 22 patients with ischemic coronary artery disease. TL defect extent was assessed by computerized quantitation using the number of abnormal segments (maximum, 100 per view; 3 views = 300). Lung uptake (LU) and left ventricular cavity size (LV size) were also assessed.

	n	LU(n)	LV SIZE(n)	TL DEFECT(n)	TL Extent(x)
IE	22	8	8	22	90
LLE	22	2*	3*	20	47*

*p < 0.05

All patients had reversible TL defects with IE while all but 2 had defects with LLE. Although the location of TL defects was similar, the mean abnormal segment score was significantly less with LLE than IE. Both lung uptake and cavity size changes were more frequent with IE. CONCLUSION: Thallium-201 imaging following submaximal exercise results in significantly smaller defects, less lung uptake and cavity dilation when compared with incremental, symptom-limited exercise. Thus, submaximal exercise may underestimate the extent of the ischemic area as well as the presence of important prognostic markers of lung uptake and cavity dilation.